10CFR50.73

Virginia Electric and Power Company
Surry Power Station
5570 Hog Island Road
Surry, Virginia 23883

December 31, 1997

U. S. Nuclear Regulatory Commission
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Washington, D. C. 20555

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Dear Sirs:

Pursuant to Surry Power Station Technical Specifications, Virginia Electric and Power Company hereby submits the following Licensee Event Report applicable to Surry Power Station Unit 2.

REPORT NUMBER

50-281/97-004-00

This report has been reviewed by the Station Nuclear Safety and Operating Committee and will be forwarded to the Management Safety Review Committee for its review.

Very truly yours,

for D. A. Christian
Station Manager

Enclosure

Commitments contained in this letter: None

copy: Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

R. A. Musser
NRC Senior Resident Inspector
Surry Power Station

CATEGORY 1

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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 4/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
SURRY POWER STATION , Unit 2	05000 - 281	1 OF 6

TITLE (4)

Invalid MSTV Indication Results In Manual Reactor Trip With ESF Actuation

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCUMENT NUMBER
12	02	97	97	-- 004 --	00	12	31	97		05000-
									FACILITY NAME	DOCUMENT NUMBER 05000-

OPERATING MODE (9)	N	**THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §:** (Check one or more) **(11)**					
POWER LEVEL (10)	100 %		20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
			20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71
			20.2203(a)(2)(ii)		20.2203(a)(4)	X	50.73(a)(2)(iv)		OTHER
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
D. A. Christian, Station Manager	(757) 365-2000

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
				NA						

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) **(16)**

On December 2, 1997, at 0930 hours, Surry Unit 2 was manually tripped from 100% reactor power when the Main Steam Trip Valve (MSTV) Closed annunciator was received and MSTV A position lights indicated intermediate position. The manual reactor trip was initiated to minimize a unit transient for a MSTV closure event. Automatic actuations occurred as expected. Six Individual Rod Position Indicators (IRPI) initially indicated between 10 and 20 steps and all eventually drifted to less than 10 steps. It was later determined that MSTV A was full open and no signals were present for the valve to close.

The cause of the event was movement of the MSTV A open limit switch arm from its full open position. The limit switch arm and valve position arm were determined to have marginal overlap. Work activity in the area may have caused the repositioning of the limit switch. The position of the switch was subsequently adjusted to provide sufficient overlap.

Prior to returning to 100% reactor power, the Turbine Driven Auxiliary Feedwater (TDAFW) pump turbine tripped on overspeed during routine testing. The governor was replaced and a root cause evaluation was initiated to determine the cause for the overspeed trip.

No conditions adverse to safety resulted from this event and the health and safety of the public were not affected. This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv).

1.0 DESCRIPTION OF THE EVENT

On 10/31/97, insulation on the bonnet of Unit 2 Main Steam Trip Valve (MSTV) A [EIIS-SB,ISV] was removed to observe a steam leak that was identified during a Hot Shutdown (HSD) walkdown. The MSTV A was closed at the time of the walkdown. After the MSTV A was opened, the steam leak had stopped with no work performed. On 12/1/97, the insulators were directed to reinstall the insulation on the bonnet of MSTV A.

On 12/2/97, a pre-job briefing was held by the insulators and their foreman to discuss the reinstallation of the MSTV insulation. Potential unit trip hazards and personnel safety hazards were discussed. After this briefing, Operations was contacted to obtain permission to start work. The directions provided by the Operations Shift Supervisor for the insulators focused on personnel safety issues.

At approximately 0915 hours on 12/2/97, two insulators began work to reinstall insulation on the Unit 2 MSTV A bonnet. At 0930 hours, Main Control Room annunciator 2H-A-8, Main Steam Trip Valve Closed, was received and intermediate indication was observed to exist for the MSTV A. The Unit 2 Reactor Operator (RO), with concurrence from a Senior Reactor Operator (SRO), manually tripped Unit 2 from 100% reactor power due to the MSTV indications. The manual reactor trip was initiated to minimize the transient on the unit for a MSTV closure event. It was subsequently determined that the open limit switch arm for the MSTV A had inadvertently moved below the valve position arm which caused the subject annunciator and the intermediate valve position indication. The valve was verified to have remained full open and no signals were present for the valve to close.

Following the manual Reactor Protection System (RPS) [EIIS-JC] actuation, the main turbine and reactor tripped as designed. Six Individual Rod Position Indicators (IRPI) (G-3, J-13, L-5, F-6, F-8, and F-12) [EIIS-AA,ZI] initially indicated between 10 and 20 steps and eventually drifted to less than 10 steps. Also, the rod bottom light for F-8 did not light initially, however, it subsequently lit as the IRPI indication drifted down. In accordance with station emergency procedures, the Reactor Coolant System (RCS) [EIIS-AB] was borated with an additional 1108 gallons to account for the above IRPI indications. The shutdown margin for Unit 2 was determined to be satisfactory.

Both Motor Driven Auxiliary Feedwater (MDAFW) pumps [EIIS-BA,P] and the Turbine Driven Auxiliary Feedwater (TDAFW) pump [EIIS-BA,P] automatically started as designed on low-low steam generator (SG) level. The steam dump valves [EIIS-SB,V] opened to decrease the RCS temperature to the no load value. No primary safety or power operated relief valves actuated during the event. No secondary safety relief valves or power operated relief valves (PORV) actuated during the transient, however, after stabilizing the unit, SG PORVs A and B automatically opened due to RCS heat-up to approximately 550°F. Actions were taken to

reduce RCS temperature and close the PORVs. There were no radiation releases due to this event.

Auxiliary feedwater flow to all three SGs was verified as adequate and by 0950 hours all three SGs low-low level annunciators cleared. Anticipated Transient Without Scram Mitigation System Actuation Circuitry (AMSAC) was reset and the TDAFW pump and MDAFW pumps were secured.

A 4-hour non-emergency report to the NRC Operations Center was made at 1306 hours in accordance with 10CFR50.72(b)(2)(ii) due to a manual or automatic engineered safety feature (ESF) actuation. A follow-up report to the NRC Operations Center was made at 1645 hours on 12/2/97, to correct an inaccuracy in the initial report.

Unit 2 was taken critical at 1843 hours on 12/3/97, and was ramped to 35% reactor power at 0213 hours on 12/4/97. With reactor power stable, monthly testing on the Unit 2 TDAFW pump was initiated. At 1356 hours, the turbine experienced a trip due to overspeed. Following the overspeed trip, the TDAFW pump was successfully started four times in an attempt to determine the cause of the trip. Speed ramp traces and Aircet data on governor valve stem movement were reviewed to determine governor stability. Convergent oscillations at the low speeds were noted when tested in the recirculation mode, however, diverging oscillation at operating speed, as noted during the overspeed trip, did not exist. Discussions with the governor vendor suggested that the governor was marginally stable. Although the pump functioned properly both during testing after governor installation and during the Unit 2 reactor trip, as well as during testing after the overspeed trip, the turbine governor was replaced due to stability concerns.

The TDAFW pump with the replacement governor was tested satisfactorily at 0900 hours on 12/6/97. The review of the speed ramp traces indicated stable operation and the pump was declared operational. Unit 2 was ramped to 100% power at 2223 hours on 12/6/97.

Subsequent review of the TDAFW pump overspeed event determined that the governor had not been optimized for stability following installation. A Category I RCE was initiated to investigate the cause of the overspeed trip and to recommend corrective actions.

This report is being made pursuant to 10CFR50.73(a)(2)(iv), due to the initiation of an engineered safety feature (ESF), including the reactor protection system (RPS).

2.0 SAFETY CONSEQUENCES AND IMPLICATIONS

No conditions adverse to safety resulted from this event and the health and safety of the public were not affected.

In response to the indication of the closure of the MSTV A, the Operator manually tripped the reactor and turbine. Upon receipt of the reactor trip signal, the RPS actuated and functioned as designed. Six IRPIs initially indicated between 10 and 20 steps. In accordance with station emergency procedures, additional borated water was added to the Reactor Coolant System (RCS) as a result of the IRPI indications. All IRPIs eventually drifted to less than 10 steps. The shutdown margin for Unit 2 was determined to be satisfactory. Plant response was as expected and the unit was stabilized at HSD.

The Unit 2 TDAFW pump functioned properly when tested on 10/31/97, following installation of the governor. During the Unit 2 reactor trip, the TDAFW and the MDAFW pump automatically started on low-low SG level and functioned as designed. When the TDAFW turbine tripped on overspeed during routine surveillance testing on 12/4/97, the TDAFW pump was declared inoperable and an LCO was entered to return the pump to operable status within 72 hours or be in HSD within 12 hours. The TDAFW pump governor was replaced, the pump tested and returned to service prior to the end of the LCO. During TDAFW pump LCO period, the MDAFW pumps were operable and available to provide required auxiliary feedwater.

3.0 CAUSE

The direct cause of the manual reactor trip and the subsequent initiation of auxiliary feedwater was the open limit switch arm on MSTV A being inadvertently displaced below the valve position bar resulting in an intermediate light indication in the Main Control Room and Annunciator 2H-A-8 being received. The limit switch arm and the valve position arm had marginal overlap and the design of the support bracket for the open limit switch did not allow for adjustments to compensate for fabrication tolerances. It was also observed that the roller on the switch arm had wear indentations that may have reduced the overlap.

At the time of the event, insulation was being installed on the bonnet of MSTV A valve. Although a walk-through task analysis by the insulators demonstrated that their actions should not have impacted the limit switch components enough to cause the switch arm to misposition, work activity in the area by the insulators could have contributed to the event.

During a follow up investigation of the Unit 2 TDAFW pump overspeed event, it was determined that the governor had not been optimized for stability following replacement during the Fall 1997 Unit 2 outage. A review of testing conducted following the overspeed event indicated that the pump was marginally stable. A root cause evaluation (RCE) has been initiated to determine the cause for the overspeed trip.

4.0 IMMEDIATE CORRECTIVE ACTIONS

Following the reactor trip, Control Room Operators acted promptly to place the plant in a safe hot shutdown condition in accordance with emergency and other operating procedures.

The Shift Technical Advisor calculated the shutdown margin and monitored the critical safety function status trees to verify that the unit conditions were acceptable. Plant response was as expected and the unit was stabilized at hot shutdown.

5.0 ADDITIONAL CORRECTIVE ACTIONS

A Root Cause Evaluation (RCE) team was established to determine the cause of the reactor trip and to develop recommendations to prevent recurrence.

In accordance with Engineering Transmittal S-97-0382, the open limit switch for the MSTV A was relocated closer to the valve position bar to provide additional overlap. The remaining Unit 2 and the Unit 1 open limit switch arm positions were inspected and sufficient overlap was determined to exist. In addition, no generic concerns exist with respect to limit switch installation as no previous events have been identified.

Six IRPIs indicated between 10 and 20 steps initially and then drifted to less than 10 steps. Each IRPI indication signal conditioning module was adjusted, satisfactorily tested, and returned to service.

The turbine reheater control did not function as designed following the turbine trip. Relays were replaced and the reheater control circuit was tested satisfactorily and returned to service.

After plant stabilization, the pressurizer proportional heater (C Bank) tripped. Investigation determined that the breaker was opening due to the current through the breaker being at or near the time delay overcurrent protection device setting for the breaker when supplied by the Reserve Station Service Transformer A. One group of heaters was tagged out to reduce the current. This issue is being addressed by the Corrective Action Program.

After the overspeed trip of the Unit 2 TDAFW turbine governor during monthly testing, the governor was replaced and tested satisfactorily. A Category I RCE was initiated to investigate the cause of the overspeed trip and to recommend corrective actions.

6.0 ACTIONS TO PREVENT RECURRENCE

Corrective actions associated with the invalid MSTV indication and the subsequent cause of the Unit 2 manual reactor trip have been implemented and no further corrective actions are deemed necessary to preclude a similar event.

Recommendations from the Unit 2 TDAFW Pump Category I RCE will be implemented when the evaluation is complete.

7.0 SIMILAR EVENTS

None

8.0 ADDITIONAL INFORMATION

Unit 1 was operating at 100% reactor power at the time of the Unit 2 manual reactor trip. Engineering conducted a review of the Unit 1 TDAFW pump speed ramp traces and determined that there was no evidence of oscillation of any type and that the TDAFW pump was capable of performing its intended function.